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LYON & HARR, LLP
300 ESPLANADE DRIVE, SUITE 800
OXNARD, CA 93036

EXAMINER	
THANGAVELU, KANDASAMY	

ART UNIT	PAPER NUMBER
2123	3

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/657,871	BRUMITT ET AL.	
	Examiner	Art Unit	
	Kandasamy Thangavelu	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 September 2000*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-51* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,12-16,18-20,24-28,34-48,50 and 51* is/are rejected.

7)☒ Claim(s) *9-11,17,21-23,29-33 and 49* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 September 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Introduction

1. Claims 1-51 of the application have been examined.

Drawings

2. The drawings are objected to; see a copy of Form PTO-948 for an explanation.

Specification

3. The disclosure is objected to because of the following informalities:

Page 4, Lines 3-4, "entities may be created or deleted and any time during the period which the model exists" appears to be incorrect and it appears that it should be "entities may be created or deleted at any time during the period in which the model exists".

Page 10, Lines 16-17, "there is no direct measurement between the between entities involved in the query" appears to be incorrect and it appears that it should be "there is no direct measurement between the entities involved in the query".

Page 22, Lines 25-26, "if a display screen where directed away from where a person is facing" appears to be incorrect and it appears that it should be "if a display screen is directed away from where a person is facing".

Page 24, Lines 14-16, "a measurement taken directly by a user might be considered more certain that the same measurement derived from images of the scene" appears to be incorrect and it appears that it should be "a measurement taken directly by a user might be considered more certain than the same measurement derived from images of the scene".

Page 27, Lines 27-28, "In addition, an physical object could have" appears to be incorrect and it appears that it should be "In addition, a physical object could have".

Page 36, Lines 12-13, "even if there are no overlapping extents, this does not mean that a person is actually facing toward the display screen" appears to be incorrect and it appears that it should be "even if there are overlapping extents, this does not mean that a person is actually facing toward the display screen".

Appropriate corrections are required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 18-20 and 24-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 18 on Page 43, Lines 15-17, recites " so as to make the difference in the given location of the first entity frame's origin in each of the identified cycles match the location of that origin as indicated by following the chain of measurements making up the cycle". It is not clear as to how a difference can be computed from the location of said first entity frame's origin in each of the identified cycles. It is also not clear how a difference in the location (it is an error measurement) can match the location of that origin as indicated by following the chain of measurements making up the cycle.

Claim 24 on Page 46, Lines 13-15, recites " so as to make the difference in the given location of said first entity frame's origin in each of the identified cycles match the location of that origin as indicated by following the chain of measurements making up the cycle". It is not clear as to how a difference can be computed from the location of the first entity frame's origin in each of the identified cycles. It is also not clear how a difference in the location (it is an error measurement) can match the location of that origin as indicated by following the chain of measurements making up the cycle.

Claims rejected but not specifically addressed are rejected based on their dependency on rejected claims.

Claim Interpretations

6. For the purpose of art rejections, the rejected claims have been interpreted as follows:

In Claim 18 on Page 43, Lines 15-17, " so as to make the difference in the given location of the first entity frame's origin in each of the identified cycles match the location of that origin as indicated by following the chain of measurements making up the cycle" is interpreted as " so as to make the given location of the first entity frame's origin in each of the identified cycles match the location of that origin as indicated by following the chain of measurements making up the cycle".

In Claim 24 on Page 46, Lines 13-15, " so as to make the difference in the given location of the first entity frame's origin in each of the identified cycles match the location of that origin as indicated by following the chain of measurements making up the cycle" is interpreted as " so as to make the given location of the first entity frame's origin in each of the identified cycles match the location of that origin as indicated by following the chain of measurements making up the cycle".

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b)

> only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

8. Claims 1, 34 and 42 are rejected under 35 U.S.C. § 102(e) as being anticipated by **Cureton et al. (CU)** (U.S. Patent application 2002/0116200).

8.1 **CU** teaches satellite based global positioning system for feedlot computer network and method. Specifically, as per claim 1, **CU** teaches a computer-implemented process for providing a geometric model database for use in a ubiquitous computing environment to respond to queries about the environment's geometric state (Page 2, Para 0012, Para 0014, Para 0015 and Para 0016; Pages 2 and 3, Para 0019); comprising using a computer to perform the following process actions:

accepting information about the geometric state of the environment (Page 2, Para 0015 and Para 0016);

building a geometric model database of the environment based on an initial input of the information (Page 2, Para 0015 and Para 0016);

maintaining the geometric model database by modifying it based on the input of updated information about the geometric state of the environment (Page 2, Para 0016; Pages 2 and 3, Para 0019); and

responding to queries concerning the geometric relationships between entities in the environment using the geometric model database (Page 2, Para 0015 and Para 0016).

8.2 As per claim 34, **CU** teaches the process of Claim 1. **CU** also teaches the process action of responding to queries concerning the geometric relationships between entities in the environment (Page 2, Para 0015 and Para 0016) comprises an action of upon receiving a standing request from an external source, responding to the request each time a prescribed event occurs (Page 2, Para 0014 and Para 0015).

8.3 As per claim 42, **CU** teaches a computer-readable medium having computer-executable instructions for providing a geometric model database for use in a ubiquitous computing environment to respond to queries about the environment's geometric state (Page 2, Para 0012, Para 0014, Para 0015 and Para 0016; Pages 2 and 3, Para 0019); the computer-executable instructions comprising:

inputting information about the geometric state of the environment from at least one external source (Page 2, Para 0015 and Para 0016);

building a geometric model database of the environment based on an initial input of the information (Page 2, Para 0015 and Para 0016); and

maintaining the geometric model database by modifying it based on the input of updated information about the geometric state of the environment (Page 2, Para 0016; Pages 2 and 3, Para 0019).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

10. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 2-7, 12, 13, 27, 28, 35-41, 43-48, 50 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Cureton et al. (CU)** (U.S. Patent application 2002/0116200) in view of **Babst et al. (BA)** (U.S. Patent 6,429,420).

11.1 As per Claim 2, **CU** teaches the process of claim 1. **CU** also teaches the process action of accepting information about the geometric state of the environment (Page 2, Para 0015 and Para 0016); comprises the actions of:

inputting identifying information from an external source concerning an object existing in the environment, referred to as an entity, which is to be included in the geometric model database (Page 2, Para 0015 and Para 0016); and

inputting measurements, each of which defines the entity's relationship to one other entity in the geometric model database (Page 2, Para 0015 and Para 0017).

CU does not expressly teach the information comprising the entity's extent which is one of (i) the physical size of the entity, or (ii) the service region of the entity. **BA** teaches the information comprising the entity's extent which is one of (i) the physical size of the entity, or (ii) the service region of the entity (CL2, L26-31; CL2, L47-50), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the process of **CU** with the process of **BA** that included the information comprising the entity's extent which is one of (i) the physical size of the entity, or (ii) the service region of the entity, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

11.2 As per Claim 3, **CU** and **BA** teach the process of claim 2. **CU** also teaches the entity represents a camera and the camera's extent corresponds to a service region constituting a field of view of the camera (Page 2, Para 0017).

11.3 As per Claim 4, **CU** teaches the process of claim 1. **CU** also teaches the process action of building the geometric model database, comprises the actions of establishing a set of entities that are of interest in the environment (Page 2, Para 0015 and Para 0016); and

representing each entity by a coordinate frame (Page 8, Para 0084; Page 9, Para 0086).

CU does not expressly teach representing each entity by an extent, wherein the extent defines one of (i) the physical size of the entity, or (ii) the service region of the entity. **BA** teaches representing each entity by an extent, wherein the extent defines one of (i) the physical size of the entity, or (ii) the service region of the entity (CL2, L26-31; CL2, L47-50), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the process of **CU** with the process of **BA** that included representing each entity by an extent, wherein the extent defines one of (i) the physical size of the entity, or (ii) the service region of the entity, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

CU does not expressly teach characterizing the location of each entity in the environment relative to other entities using a measurement defining the entity's relationship to at least one of the other entities. **BA** teaches characterizing the location of each entity in the environment relative to other entities using a measurement defining the entity's relationship to at least one of the other entities (CL2, L26-31), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the process of **CU** with the process of **BA** that included characterizing the location of each entity in the

environment relative to other entities using a measurement defining the entity's relationship to at least one of the other entities, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

11.4 As per Claim 5, **CU** and **BA** teach the process of claim 4. **CU** also teaches the process action of establishing a set of entities comprises the actions of accepting identifying information from an external source concerning an object existing in the environment, referred to as an entity, which is to be included in the geometric model database (Page 2, Para 0015 and Para 0016);

assigning a unique entity identifier to each entity which is then used by the geometric model database and the external source in referring to the entity (Page 2, Para 0015); and

making the entity identifiers available to the external source (Page 2, Para 0015 and Para 0016).

CU does not expressly teach the information comprising the entity's extent. **BA** teaches the information comprising the entity's extent (CL2, L26-31; CL2, L47-50), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the process of **CU** with the process of **BA** that included the information comprising the entity's extent, as that would allow calculating the distance of the

detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

11.5 As per Claim 6, **CU** and **BA** teach the process of claim 5. **CU** does not expressly teach an external source provides more than one extent for an entity, and wherein the process action of assigning a unique entity identifier to each entity, comprises the actions of assigning a separate identifier to each entity-extent combination; and setting the measurement between entity-extent combinations associated with the same entity to zero. **BA** teaches an external source provides more than one extent for an entity, and wherein the process action of assigning a unique entity identifier to each entity, comprises the actions of assigning a separate identifier to each entity-extent combination; and setting the measurement between entity-extent combinations associated with the same entity to zero (CL2, L26-31; CL2, L47-50), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the process of **CU** with the process of **BA** that included an external source providing more than one extent for an entity, and wherein the process action of assigning a unique entity identifier to each entity, comprised the actions of assigning a separate identifier to each entity-extent combination; and setting the measurement between entity-extent combinations associated with the same entity to zero, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

11.6 As per Claim 7, **CU** and **BA** teach the process of claim 4. **CU** teaches the process action of representing each entity by a coordinate frame (Page 8, Para 0084; Page 9, Para 0086); and

a process action of representing each entity by a coordinate frame having a fixed geometric relationship to the physical object associated with the entity (Page 8, Para 0084; Page 9, Para 0086).

CU does not expressly teach the process action of representing each entity by an extent. **BA** teaches the process action of representing each entity by an extent (CL2, L26-31; CL2, L47-50), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the process of **CU** with the process of **BA** that included the process action of representing each entity by an extent, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

11.7 As per Claim 12, **CU** and **BA** teach the process of claim 4. **CU** also teaches an action of using a measurement specifying the position and orientation of each other entity's coordinate frame origin in terms of the coordinate frame of the entity under consideration (Page 8, Para 0084; Page 9, Para 0086).

CU does not expressly teach process action of characterizing the location of each entity in the environment relative to other entities using a measurement defining the entity's

relationship to one of the other entities. **BA** teaches process action of characterizing the location of each entity in the environment relative to other entities using a measurement defining the entity's relationship to one of the other entities (CL2, L26-31), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the process of **CU** with the process of **BA** that included process action of characterizing the location of each entity in the environment relative to other entities using a measurement defining the entity's relationship to one of the other entities, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

11.8 As per Claim 13, **CU** and **BA** teach the process of claim 4. **CU** also teaches assigning a unique measurement identifier to each measurement which is then used by the geometric model database and the external source in referring to the measurement defining the entity's relationship to another entity; and making the measurement identifiers available to the external source (Page 2, Para 0015 and Para 0016).

CU does not expressly teach process action of characterizing the location of each entity in the environment relative to other entities using a measurement defining the entity's relationship to at least one of the other entities. **BA** teaches process action of characterizing the location of each entity in the environment relative to other entities using a measurement defining the entity's relationship to at least one of the other entities (CL2, L26-31), as that allows

calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the process of **CU** with the process of **BA** that included process action of characterizing the location of each entity in the environment relative to other entities using a measurement defining the entity's relationship to at least one of the other entities, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

11.9 As per Claim 27, **CU** and **BA** teach the process of claim 4. **CU** also teaches the process action of responding to queries concerning the geometric relationships between entities in the environment (Page 2, Para 0015 and Para 0016), comprises an action of, upon receiving a request from an external source to identify the extent of a particular entity, providing the extent information to the external source (Page 2, Para 0015 and Para 0016).

11.10 As per Claim 28, **CU** and **BA** teach the process of claim 4. **CU** also teaches the process action of responding to queries concerning the geometric relationships between entities in the environment (Page 2, Para 0015 and Para 0016), comprises an action of:

waiting for incoming queries from external sources for requests concerning the relative geometric relationship between two entities (Page 2, Para 0016);

whenever a request concerning the relative geometric relationship between two entities is received, determining if a direct measurement exists between the two entities involved in the request (Page 2, Para 0015 and Para 0016);

whenever the direct measurement exists, providing information concerning the measurement to the external source making the request(Page 2, Para 0016).

11.11 As per claim 35, **CU** teaches a system for providing a geometric model database for use in a ubiquitous computing environment to respond to queries about the environment's geometric state (Page 2, Para 0012, Para 0014, Para 0015 and Para 0016; Pages 2 and 3, Para 0019); comprising:

at least one general purpose computing device; and a computer program comprising program modules executable by the computing device or devices, wherein the computing device or devices are directed by the program modules of the computer program (Page 2, Para 0014, Para 0015 and Para 0016); to

input information about the geometric state of the environment from at least one external source (Page 2, Para 0015 and Para 0016);

establish a set of entities that represent objects in the environment based on an initial input of the information (Page 2, Para 0015 and Para 0016); and

represent each entity by a coordinate frame (Page 8, Para 0084; Page 9, Para 0086).

CU does not expressly teach the computer program to represent each entity by an extent, wherein the extent is based on an initial input of the information. **BA** teaches the computer program to represent each entity by an extent, wherein the extent is based on an initial input of

the information (CL2, L26-31; CL2, L47-50), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the system of **CU** with the system of **BA** that included the computer program to represent each entity by an extent, wherein the extent was based on an initial input of the information, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

CU does not expressly teach the computer program to characterize the location of each entity in the environment relative to other entities using a measurement defining the entity's relationship to at least one of the other entities. **BA** teaches the computer program to characterize the location of each entity in the environment relative to other entities using a measurement defining the entity's relationship to at least one of the other entities (CL2, L26-31), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the system of **CU** with the system of **BA** that included the computer program to characterize the location of each entity in the environment relative to other entities using a measurement defining the entity's relationship to at least one of the other entities, as that would allow calculating the distance of the detected object by

evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

11.12 As per claim 36, **CU** and **BA** teach the system of claim 35. **CU** teaches the system comprising a program module for storing as initializing data in a non-volatile initializing database, information concerning the entities and their extents (Page 2, Para 0014, Para 0015 and Para 0016);

initializing data concerning the measurements between entities contained within the geometric model database (Page 2, Para 0014, Para 0015 and Para 0016); and

the program module for inputting information about the geometric state of the environment comprises an action of inputting the stored initializing data from the non-volatile database at the start of the process for providing a geometric model database (Page 2, Para 0015 and Para 0016; Fig 2B3-2, Item 52).

11.13 As per claim 37, **CU** and **BA** teach the system of claim 36. **CU** teaches that the program module for storing initializing data comprises a sub-module for storing only information concerning entities, extents, and measurements that is anticipated not to change substantially over time (Page 2, Para 0015 and Para 0016; Fig 2B3-2, Item 52).

11.14 As per claim 38, **CU** and **BA** teach the system of claim 37. **CU** teaches the program module for inputting information about the geometric state of the environment comprises a sub-

module for inputting update information characterizing a current geometric state of the environment (Page 2, Para 0015 and Para 0016).

11.15 As per claim 39, **CU** and **BA** teach the system of claim 38. **CU** teaches the program module for storing initializing data comprises a sub-module for storing information concerning the entities, their extents, and the measurements representative of the most current geometric state of the environment (Page 2, Para 0015 and Para 0016).

11.16 As per Claim 40, **CU** and **BA** teach system of claim 36. **CU** also teaches the program module for establishing a set of entities comprises a sub-module for assigning a unique entity identifier to each entity entered into the geometric model database, which is then used by the geometric model database and external sources in referring to the entity (Page 2, Para 0015); and

that the program module for characterizing the location of each entity in the environment relative to other entities using a measurement comprises a sub-module for assigning a unique measurement identifier to each measurement entered into the geometric model database, which is then used by the geometric model database and the external sources in referring to the measurement (Page 2, Para 0015 and Para 0016).

11.17 As per Claim 41, **CU** and **BA** teach system of claim 40. **CU** also teaches that the program module for storing initializing data further comprises sub-modules for storing the entry and measurement identifiers assigned to the entities (Page 2, Para 0015 and Para 0016);

measurements comprising the initializing data in a non-volatile initializing database (Page 2, Para 0015 and Para 0016; Fig 2B3-2, Item 52); and

making the entity and measurement identifiers available to the external sources (Page 2, Para 0015 and Para 0016).

11.18 As per Claim 43, **CU** and **BA** teach the computer-readable medium of claim 42. **CU** also teaches that the instruction for building the geometric model database, comprises sub-modules for establishing a set of entities representing objects in the environment (Page 2, Para 0015); and

sub-modules for representing each entity by a coordinate frame (Page 8, Para 0084; Page 9, Para 0086).

CU does not expressly teach sub-modules for representing each entity by an extent. **BA** teaches sub-modules for representing each entity by an extent (CL2, L26-31; CL2, L47-50), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the instruction for building the geometric model database of **CU** with the instruction for building the geometric model database of **BA** that included sub-modules for representing each entity by an extent, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

CU does not expressly teach sub-modules for characterizing the location of each entity in the environment relative to other entities using a measurement defining the entity's relationship

to one of the other entities. **BA** teaches sub-modules for characterizing the location of each entity in the environment relative to other entities using a measurement defining the entity's relationship to one of the other entities (CL2, L26-31), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the instruction for building the geometric model database of **CU** with the instruction for building the geometric model database of **BA** that included sub-modules for characterizing the location of each entity in the environment relative to other entities using a measurement defining the entity's relationship to one of the other entities, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

11.19 As per claim 44, **CU** and **BA** teach the computer-readable medium of claim 43. **CU** teaches that the instruction for inputting information about the geometric state of the environment comprises a sub-module for inputting update information characterizing a current geometric state of the environment (Page 2, Para 0015 and Para 0016).

11.20 As per claim 45, **CU** and **BA** teach the computer-readable medium of claim 44. **CU** teaches that the instruction for maintaining the geometric model database, comprises a sub module for updating the geometric model database on an on-going basis, using the inputted

update information characterizing a current geometric state of the environment (Page 2, Para 0015 and Para 0016);

to ensure to the best degree possible given the update information, that only entities currently existing in the environment and their associated current extents are included in the database (Page 2, Para 0016).

CU does not expressly teach that measurements between the current entities are representative of the current geometric relationships between the current entities. **BA** teaches that measurements between the current entities are representative of the current geometric relationships between the current entities (CL2, L26-31), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the instruction for building the geometric model database of **CU** with the instruction for building the geometric model database of **BA** that included the measurements between the current entities representative of the current geometric relationships between the current entities, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

11.21 As per claim 46, **CU** and **BA** teach the computer-readable medium of claim 45. **CU** teaches that the sub module for establishing a set of entities, comprises sub-modules for assigning a unique entity identifier to each entity entered into the geometric model database,

which is then used by the geometric model database and external sources in referring to the entity (Page 2, Para 0015); and

making the entity identifiers available to the external sources (Page 2, Para 0015 and Para 0016).

11.22 As per claim 47, **CU** and **BA** teach the computer-readable medium of claim 46. **CU** teaches that the sub-module for establishing a set of entities, further comprises a sub-module for deactivating existing entity identifiers associated with entities that are indicated in the update information as no longer being in the environment (Page 2, Para 0015)

11.23 As per claim 48, **CU** and **BA** teach the computer-readable medium of claim 47. **CU** teaches sub-modules for assigning a unique measurement identifier to each measurement entered into the geometric model database, which is then used by the geometric model database and external sources in referring to the measurement (Page 2, Para 0015 and Para 0016); and

making the measurement identifiers available to the external sources (Page 2, Para 0015 and Para 0016).

CU does not expressly teach the sub-module for characterizing the location of each entity in the environment relative to other entities using a measurement. **BA** teaches the sub-module for characterizing the location of each entity in the environment relative to other entities using a measurement (CL2, L26-31), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious

to one of ordinary skill in the art at the time of Applicants' invention to combine the instruction for building the geometric model database of **CU** with the instruction for building the geometric model database of **BA** that included the sub-module for characterizing the location of each entity in the environment relative to other entities using a measurement, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

11.24 As per claim 50, **CU** and **BA** teach the computer-readable medium of claim 43. **CU** teaches sub-modules for assigning a unique measurement identifier to each measurement entered into the geometric model database, which is then used by the geometric model database and external sources in referring to the measurement (Page 2, Para 0015 and Para 0016); and

making the measurement identifiers available to the external sources (Page 2, Para 0015 and Para 0016).

CU does not expressly teach the sub-module for characterizing the location of each entity in the environment relative to other entities using a measurement. **BA** teaches the sub-module for characterizing the location of each entity in the environment relative to other entities using a measurement (CL2, L26-31), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the instruction for building the geometric model database of **CU** with the instruction for building the geometric model database of **BA** that included the sub-module for characterizing the location of each entity

in the environment relative to other entities using a measurement, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

11.25 As per claim 51, **CU** and **BA** teach the computer-readable medium of claim 50. **CU** teaches sub-modules for whenever a new current measurement is provided in the inputted update information, using it to replace the corresponding measurement already existing in the geometric model database (Page 2, Para 0016); and

assigning the measurement identifier associated with the existing measurement to the new current measurement (Page 2, Para 0015 and Para 0016).

CU does not expressly teach the sub-module for characterizing the location of each entity in the environment relative to other entities using a measurement. **BA** teaches the sub-module for characterizing the location of each entity in the environment relative to other entities using a measurement (CL2, L26-31), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the instruction for building the geometric model database of **CU** with the instruction for building the geometric model database of **BA** that included the sub-module for characterizing the location of each entity in the environment relative to other entities using a measurement, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

12. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Cureton et al.** (**CU**) (U.S. Patent application 2002/0116200) in view of **Babst et al. (BA)** (U.S. Patent 6,429,420), and further in view of **Kacyra et al. (KA)** (U.S. Patent 6,473,079).

12.1 As per Claim 8, **CU** and **BA** teach the process of claim 4. **CU** teaches the process action of representing each entity by a coordinate frame (Page 8, Para 0084; Page 9, Para 0086).

CU does not expressly teach the process action of representing each entity by an extent. **BA** teaches the process action of representing each entity by an extent (CL2, L26-31; CL2, L47-50), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the process of **CU** with the process of **BA** that included the process action of representing each entity by an extent, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

CU does not expressly teach a process action of characterizing an entity's extent as a polygonal region within the environment defined in terms of the entity's coordinate frame whenever the external source provides information as to the shape of the entity's extent. **KA** teaches a process action of characterizing an entity's extent as a polygonal region within the environment defined in terms of the entity's coordinate frame whenever the external source provides information as to the shape of the entity's extent (CL23, L55-67), as that allows

indicating which portions of the scene are to be scanned by the camera by indicating a sequence of points that represent the bounding polygon of the scan region (CL3, L4-5). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the process of **CU** with the process of **KA** that included a process action of characterizing an entity's extent as a polygonal region within the environment defined in terms of the entity's coordinate frame whenever the external source provides information as to the shape of the entity's extent, as that would allow indicating which portions of the scene were to be scanned by the camera by indicating a sequence of points that represented the bounding polygon of the scan region.

13. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Cureton et al. (CU)** (U.S. Patent application 2002/0116200) in view of **Babst et al. (BA)** (U.S. Patent 6,429,420), and further in view of **Cox et al. (CO)** (U.S. Patent 5,363,305).

13.1 As per Claim 14, **CU** and **BA** teach the process of claim 12. **CU** teaches the process action of using a measurement specifying the position and orientation of each other entity's coordinate frame origin in terms of the coordinate frame of the entity under consideration (Page 8, Para 0084; Page 9, Para 0086).

CU does not expressly teach the process action comprises an action of assigning a spatial uncertainty estimate to the measurement which is indicative of the accuracy of the method used to obtain the measurement. **CO** teaches the process action comprises an action of assigning a spatial uncertainty estimate to the measurement which is indicative of the accuracy of the method

used to obtain the measurement (CL2, L31-57), as that allows the entities to be observed in successive camera measurements and attach a measure of credibility to each measurement (CL2, L39-57). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the process of **CU** with the process of **CO** that included the process action comprising an action of assigning a spatial uncertainty estimate to the measurement which was indicative of the accuracy of the method used to obtain the measurement, as that would allow the entities to be observed in successive camera measurements and attach a measure of credibility to each measurement.

14. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Cureton et al. (CU)** (U.S. Patent application 2002/0116200) in view of **Babst et al. (BA)** (U.S. Patent 6,429,420), and further in view of **Cox et al. (CO)** (U.S. Patent 5,363,305) and **Davison et al. (DA)** (U.S. Patent 6,516,099).

14.1 As per Claim 15, **CU, BA** and **CO** teach the process of claim 14. **CU** teaches that each measurement is provided to the geometric model database by an external source (Page 2, Para 0014 and Para 0015).

CU does not expressly teach that more than one measurement defining an entity's relationship to another entity may be provided by separate external sources. **DA** teaches that more than one measurement defining an entity's relationship to another entity may be provided by separate external sources (CL1, L21-23), as that allows the most accurate relationship being selected (CL2, L31-32). It would have been obvious to one of ordinary skill in the art at the time

of Applicants' invention to combine the process of **CU** with the process of **DA** that included more than one measurement defining an entity's relationship to another entity to be provided by separate external sources, as that would allow allows the most accurate relationship being selected.

CU does not expressly teach the process action of characterizing the location of each entity in the environment relative to other entities using a measurement. **BA** teaches the process action of characterizing the location of each entity in the environment relative to other entities using a measurement (CL2, L26-31), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the process of **CU** with the process of **BA** that included the process action of characterizing the location of each entity in the environment relative to other entities using a measurement, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

CU does not expressly teach an action of, whenever more than one measurement defining an entity's relationship to another entity is received, using only the measurement having the lower uncertainty. **DA** teaches an action of, whenever more than one measurement defining an entity's relationship to another entity is received, using only the measurement having the lower uncertainty (CL2, L27-32), as that allows the most accurate relationship being selected (CL2, L31-32). It would have been obvious to one of ordinary skill in the art at the time of Applicants'

invention to combine the process of **CU** with the process of **DA** that included an action of, whenever more than one measurement defining an entity's relationship to another entity is received, using only the measurement having the lower uncertainty, as that would allow the most accurate relationship being selected.

14.2 As per Claim 16, **CU, BA** and **CO** teach the process of claim 14. **CU** teaches that each measurement is provided to the geometric model database by an external source (Page 2, Para 0014 and Para 0015).

CU does not expressly teach that more than one measurement defining an entity's relationship to another entity may be provided by separate external sources. **DA** teaches that more than one measurement defining an entity's relationship to another entity may be provided by separate external sources (CL1, L21-23), as that allows the most accurate relationship being selected (CL2, L31-32). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the process of **CU** with the process of **DA** that included more than one measurement defining an entity's relationship to another entity to be provided by separate external sources, as that would allow allows the most accurate relationship being selected.

CU does not expressly teach the process action of characterizing the location of each entity in the environment relative to other entities using a measurement. **BA** teaches the process action of characterizing the location of each entity in the environment relative to other entities using a measurement (CL2, L26-31), as that allows calculating the distance of the detected object by evaluating the geometrical values (CL3, L4-5) and allows the entity such as a vehicle or

mobile robot to detect an obstacle in the path of the entity (CL1, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the process of **CU** with the process of **BA** that included the process action of characterizing the location of each entity in the environment relative to other entities using a measurement, as that would allow calculating the distance of the detected object by evaluating the geometrical values and allow the entity such as a vehicle or mobile robot to detect an obstacle in the path of the entity.

CU does not expressly teach an action of, whenever more than one measurement defining an entity's relationship to another entity is received, arbitrarily choosing one of the measurements for use in characterizing the locations. **DA** teaches an action of, whenever more than one measurement defining an entity's relationship to another entity is received, arbitrarily choosing one of the measurements for use in characterizing the locations (CL2, L39-46), as that allows a selection of different relationships (CL2, L45-46). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the process of **CU** with the process of **DA** that included an action of, whenever more than one measurement defining an entity's relationship to another entity is received, arbitrarily choosing one of the measurements for use in characterizing the locations, as that would allow a selection of different relationships.

Allowable Subject Matter

15. Claims 9-11, 17-26, 29-33 and 49 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to the Applicants' disclosure.

The following patents and papers are cited to further show the state of the art at the time of Applicants' invention with respect to Geometric model database for use in ubiquitous computing.

1. Papka et al., "Ubiworld: An environment integrating Virtual reality, supercomputing and design", IEEE, 1996.
2. Peurach et al., "Pose determination and tracking by matching 3D objects to a 2D sensor", U.S. Patent 6,173,066, January 2001.
3. Fox et al., "Integrating information appliances into an interactive workspace", IEEE, May/June 2000.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kandasamy Thangavelu whose telephone number is 703-305-0043. The examiner can normally be reached on Monday through Friday from 8:00 AM to 5:30 PM.

If attempts to reach examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Teska, can be reached on (703) 305-9704. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-9600.

K. Thangavelu
Art Unit 2123
December 6, 2003